Increasing Higher Education's Contribution to Economic Development in Washington

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EXECUTIVE SUMMARY

I. This report analyzes the relationship between higher education and economic development and discusses ways in which the contributions of higher education to Washington's economy can be increased.

II. Findings
   - A. Higher education and economic growth are demonstrably linked.
   - B. Basic economic forces are tightening the links.
   - C. The key links include common research interests and consulting arrangements as well as educational programs.
   - D. Among the more common approaches used by states to facilitate campus-driven economic development are:
     1. Programs of campus-based *technical and management assistance* to business;
     2. Programs to enhance and expedite *technology transfer* from university laboratories to marketable products, processes and services;
     3. *Subsidized job training provided by academic institutions and customized for employers* who can show that, without the subsidized training, they would leave the state or not locate in the state;
     4. *A state-funded seed grant fund, with an industry matching requirement, designed to encourage university-industry cooperative projects* on campuses and in departments where these "should" exist but do not;
     5. *Subsidized, campus-based business "incubators"* designed to nurture embryonic companies in fields where the host campus has faculty strength and the facilities to help the company through its difficult early life stages;
     6. *Subsidized, campus-based research parks* designed to attract firms with interest in access to university people and facilities.

III. Conclusions
   - A. *A multi-campus statewide program of expanded and fully-coordinated campus-based management and technical assistance to Washington firms, built upon resources and structures already present on many campuses, appears both feasible and desirable and not very costly.* Additional documentation of need and further program design work is necessary, however.
   - B. *Technology transfer offices at UW and WSU are performing well with the resources they have, but are well behind peer universities in both funding and indicators of economic impact.*
   - C. *The Washington Technology Center shows early promise of producing a favorable impact on Washington's economy.*

TABLE OF CONTENTS

Executive Summary

I. Purpose of the Report and Overview .....

II. Does Higher Education Contribute to a State's Economic Development? If so, How? .....
Higher Education's Increased Importance in the "New International Economy" .....
Contributions of Higher Education to Economic Development Via Research and Technological Equipment and Expertise .....
High-Technology As a Source of Employment Growth .....
Implications for Washington .....

III. Possible Future Steps State Government Could Take to Try to Increase the Economic Returns from Higher Education
State Subsidies for Customized Job Training .....
Campus-based Business Incubators .....
Publicly-Subsidized Research Parks .....
State Subsidies to Encourage University-Industry Cooperative Programs .....

IV. Highest Priority Areas: (A) Augmenting Campus-based Technical and Management Assistance and (B) Strengthening Technology Transfer Programs .....
A. Campus-based Technical and Management Assistance .....
Models Operating in Other States .....
Existing Programs in Washington .....
Summary: Needs Not Now Filled .....
Key Design Elements For Successful Management and Technical Assistance Programs .....
B. Enhancing Technology Transfer Efforts .....
Strengthening Campus Technology Transfer Offices .....
The Washington Technology Center .....

V. Summary and Conclusions .....
Campus-based Technical and Management Assistance .....
Technology Transfer Programs .....

Appendix Table 5A

Technical Appendix for Technology Transfer Data Tables

Council of Presidents, *A Partial List of Current Activities Related to Economic Development at Each Four-Year Public Institution*

Sources Consulted
Books, Articles, Reports and Papers .....
Interviews .....

I. PURPOSE OF THE REPORT AND OVERVIEW

This report is addressed to those interested in the direct contributions of higher education to Washington's economic development. Within this broad area of inquiry, we have sought to identify and focus our attention on types of programs whose potential economic development impact *and* feasibility are clear. Thus, some of the more exotic but less well-tested ideas (of which there is no shortage) have been set aside in order to look more carefully at what there is good reason to believe will work, and will be applicable and feasible for Washington's colleges and universities.

The report is organized as follows. The next section (Section II) explains the basic logic of the widely-alleged link between higher education and economic development and provides an overview of what is know about the matter. In particular, we focus on the reasons why the link has grown stronger in recent years. Next (in Section III), we describe briefly some of the specific types of higher education-economic development connections that might be applicable to Washington's circumstances but on which we have chosen *not* to focus our primary attention at this time. A very brief indication of the merits and likely problems with each of these is also given in this section as a guide to possible further work on some of them.

The core of the report is contained in Section IV where we present our suggestions as to which economic-development-related higher education programs merit the high priority. The rationale for these suggestions is presented, including discussion of the evidentiary base, program design issues and the ways in which our suggestions mesh with existing efforts on Washington's campuses. Our suggested high-priority program areas have two broad themes: (1) increasing and better targeting campus-based technical and management assistance to firms throughout the state; and (2) expediting "technology transfer", i.e., spurring technological development in Washington drawing upon campus-based research. In the latter area we find support for two types of activities: one is the demonstrably successful efforts of the technology transfer offices at the research universities; the second is the Washington Technology Center, a promising program of targeted research aimed at technologies of potential or current commercial interest.

Of these three major recommendations, only the one regarding increased campus-based technical and management assistance to Washington firms might imply a new program structure. Even in this instance existing activities and programs on many of the campuses could be used to provide much of the infra-structure and support for the type of program we recommend. An implication of all three of our recommendations is to use redirected or modest, but carefully targeted, incremental dollars to extract more economic development payoff from the rich intellectual and physical resources already present on Washington's 33 public campuses. In each case, we will show that there is good reason to believe—based on experience with similar ventures here and/or elsewhere—that these payoffs will actually materialize.

The final section of the report (Section V) provides a brief summary of our conclusions and recommendations for the reader's convenience.

II. DOES HIGHER EDUCATION CONTRIBUTE TO A STATE'S ECONOMIC DEVELOPMENT? IF SO, HOW?

The relationship between the education level of the labor force and economic growth is now well-established. More educated workers earn substantially more than do workers with less education even after taking account of, to the extent possible, other factors correlated with both education and earnings (Becker 1975; Cohn 1979; Haveman and Wolfe 1984; Solmon 1985). The most authoritative estimated of the contribution of growth in education to U.S. economic growth (over the period 1919-1982) places this contribution at 14 percent of the total growth if only gains in labor force education per worker are counted, or 42 percent if "advances in knowledge" relevant to production are also counted (Denison 1985). Estimated for Washington state derived from Denison's model suggest that education's contributions to growth *via labor force education alone* approximated half a billion dollars per year during the early 1980's (Stromsdorfer 1986). Recent studies that have attempted to pinpoint the impact of *quality* of education (mainly higher education) on earnings and economic growth have also found strong positive effects (Solmon 1985).

Not surprisingly, there is strong empirical *evidence* that firms place a high priority on proximity to academic institutions in their formation and location decisions (see especially Office of Technology Assessment 1984: 28-40, 56-57). This is particularly true for research and development-intensive facilities and is true to a considerable extent also for such desirable high-growth employers are technology-intensive production facilities (OTA 1984: 28-40) and high-wage "producer services" firms (Beyers et al 1986).[1]

Higher Education's Increased Importance in the "New International Economy"

As the data alluded to above suggest, the U.S. and Washington economies are changing rapidly in ways that make postsecondary education even more central to economic growth than it has been in the past. This country is losing or has lost its comparative advantage (roughly speaking, its competitiveness relative to other producing nations) in many manufacturing activities just as most business activities (including both production and marketing aspects) have become more internationally competitive. Interregional

[1] On the last category, see especially Beyers et al's 1985 and 1986 survey data on the Puget Sound region. Their analysis shows the producer services industry group to be a critical engine of the region's recent and future economic growth—producing a high percentage of all Puget Sound region job growth during the 1970's and 80's (Beyers et al 1985: 1-9)—and one closely tied to higher education. Since these firms have much higher proportions of their work force in professional, technical and managerial occupations than do manufacturing firms (roughly 43 percent versus 11 percent), they require educated workers and continuing education opportunities for them in order to grow, and are very concerned about education quality (Beyers et al 1986: iii, xi-xiii). The "producers services" industry group is defined as firms providing services to other firms or government and includes finance, insurance and real estate firms; architecture and engineering firms; law, accounting, management and computer/information systems consulting firms; health, education and training services; research, development and testing services; and transportation, communications and utilities services; as well as various specialized and miscellaneous business services.

competition within the U.S. for markets and jobs has increased as well for much the same reasons. At the same time, the rate of technological change in many products and services and in processes for providing them (e.g., computerization) has accelerated sharply. These conditions create both a challenge and an opportunity for the U.S. and for Washington, proportionally the nation's largest exporting state. The state's competitive niche in the "new international economy" is almost certain to lie increasingly in providing the R&D behind new processes, products and services and their initial production and marketing, and less than in the past in long-term, large-scale production of established products using established technologies. In the increasingly competitive world economy these types of production activities are continuing to show a tendency to migrate to low-cost regions of the nation and world.[2]

In such an internationalized, technology-oriented and rapidly-changing economic environment high-quality colleges, universities and technical training institutions take on a new level of importance. Not only are they the source of the initial education and training of key components of the higher-quality work force successful firms need in the competitive new economy,[3] but they must also be prepared to provide the increasingly necessary continuing education and retraining required by a skilled work force that needs to be at, or at least able to cope with, the cutting edge of change. This applies to regions of the state seeking to diversify a narrow economic base or to revitalize via new technology traditional industries where markets have become more competitive, as well as to the already technology-intensive regions.

Contributions of Higher Education to Economic Development Via Research and Technological Equipment and Expertise

The increasingly important role of high-quality postsecondary education and training to Washington's long-term economic future now holds the attention of the state's opinion leaders and policymakers. The education and training of students is the role played by academic institutions that is best known and understood by them. But there are other important roles these institutions play, or could play, that are directly related to Washington's economic development. These are distinct from the education and training role, although closely related to it. It is an important purpose of this report to help explicate these other economic development roles of academic institutions for the benefit of state policymakers as well as to suggest actions to enhance the institutions' performance in them. The economic development roles on which we will focus here are those that do or could grow out of the research capability and scientific, technological and management-related expertise present on the state's campuses. First, these capabilities and their links and potential links to industry and business need to be outlined.

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[2] Resource-based industries and manufacturing of products heavily dependent on local raw materials and/or local markets are less prone to these pressures, but even they face incentives to become more productive lest lower-cost competition from other regions and nations erode their established markets.

[3] A surprisingly large component of this work force consists of entrepreneurs (firm founders) themselves. This is so because new firm formations are so important in the new economy and new firms tend to be small (see Beyers 1986; Birch 1986).

At the outset, the economic importance of the sheer quantity of federal research dollars brought into Washington by the state's institutions of higher education, largely but not exclusively by the University of Washington[4] and Washington State University, should be recognized. This sum was in the neighborhood of $150 million in FY1984. Since this is purchasing power that would not otherwise be present in the state and it has a substantial multiplier effect in terms of creating demand for goods and services produced in the region (and for labor), it is a very important part of the state's economic base. Moreover, this already productive resource can be made significantly more productive for the state in ways we shall detail later.

Research and technology-driven links between academic institutions and industry are increasingly important in the new economy if academic research is to be of maximum value to industry and rapidly utilized to improve processes, products and services. As is true in most other states, Washington's universities and firms have increased, and even institutionalized, their interactions in recent years. The four-year institutions have prepared an inventory (appended to this report) including a number of kinds of links with industry, many of which have been developed within the last few years as firms and universities have seen that they have more and more common interests. Perhaps the best available single indicator of the increased industrial interest is the recent trend in industrial support of university research, which has grown at the University of Washington from $7.2 million (3.5% of the total) to nearly $11 million (4.6% of the total) in just the last two years. At Washington State the proportion of industrial support has grown from 3.0% in FY1984 to 4.5% in FY1986.

Also of importance, faculty and other professional staff (and, to some extent, students) provide professional services, i.e., technical and/or management advice and assistance, to hundreds of Washington firms each year, though the exact amount and impact of this diverse activity is impossible to document at present. There are some formal, campus-based programs of business and, to a small extent, technical assistance (to be described more fully later), but much of the activity is informal or conducted outside the provider's university role entirely.[5] Thus, it isn't measured, much less coordinated or systematically evaluated.

In addition, colleges and universities have valuable scientific and technical facilities and equipment, not all of which is utilized by campus users all of the time. At the same time firms, especially but not exclusively small, technically-oriented companies with limited resources but significant growth potential, have need of such facilities and equipment which they are often unable to purchase for themselves. Leanly-funded universities could obtain revenue from charges for use of such facilities for many purposes, including desirable maintenance and updating of the facilities themselves. Again, it is not known how much of

[4] The University of Washington ranked fourth among the nation's universities in FY1984 in federal research awards. It was the only public university receiving more federal than state funds in that year, suggesting a powerful economic leverage effect from the state funds spent on the campus (in particular from that part of the university's state budget base that keeps it at least nearly competitive with other research universities competing for the same grants and grant-seekers).

[5] University policies typically permit faculty and other academic personnel to spend up to one day per seven day week in "outside professional activities," including consulting for compensation. Personnel are supposed to clear such activities before the fact with their administrative superiors but no policy-relevant information seems to be compiled from these records.

this kind of mutually beneficial utilization of existing resources occurs now since no one seems to organize or keep track of it centrally.